

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In the Patent Application of

Davide Parachini et al.

Serial No.: 10/757,890

Filed: January 15, 2004

For: REFRIGERATOR WITH INTERNAL
COMPARTMENT DIVISIBLE INTO
INDEPENDENT TEMPERATURE
ZONES

Group Art Unit: 3744

Examiner: Bankhead, Gene L.

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal Brief pursuant to 37 C.F.R. § 41.37 in support of Applicants' appeal of the Final Rejection of the Examiner, mailed June 15, 2006 claims 2-15. Each of the topics required by 37 C.F.R. § 41.37 is presented herewith and is labeled appropriately.

I. REAL PARTY IN INTEREST

Whirlpool Corporation, having offices in Benton Harbor, Michigan ("Whirlpool") is the real party in interest of the present application. An assignment of all rights in the present application to Whirlpool was executed by the inventors and recorded in the U.S. Patent and Trademark Office at Reel 014899, Frame 0092.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences related to the present application of which Appellants, Appellants' legal representatives, or Assignee are aware.

III. STATUS OF CLAIMS

The application has 15 claims, which are presented in the Appendix. Claim 1 has previously been cancelled and claims 2-15 are currently pending. Claims 2-9 have been twice rejected by the Examiner and claims 10-15 have been rejected once. Accordingly, the Appellants hereby appeal the final rejection of claims 2-15.

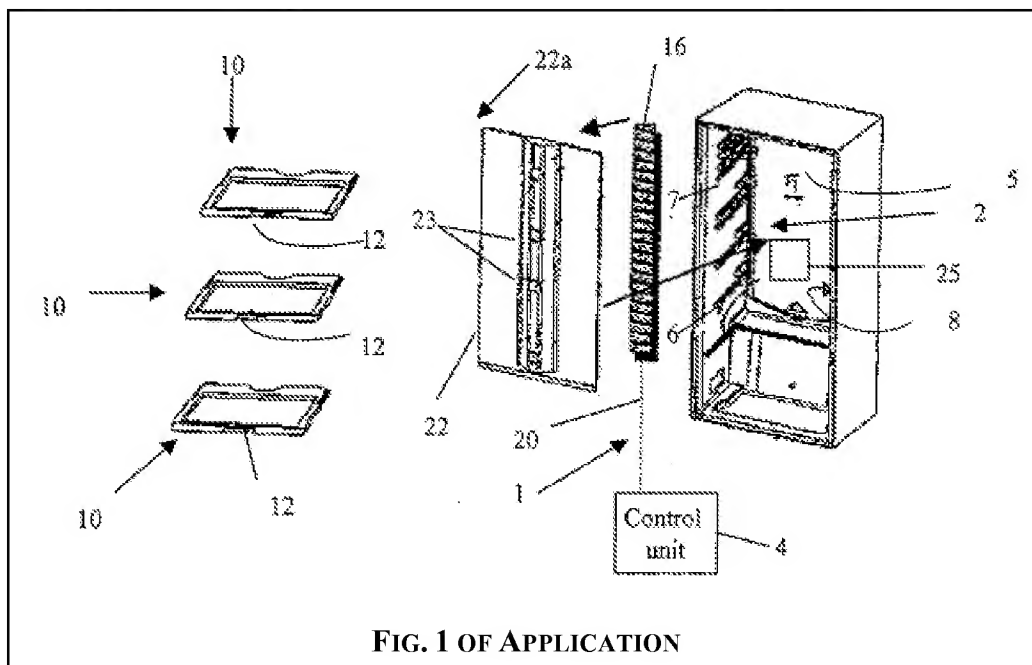
IV. STATUS OF AMENDMENTS

Subsequent to the final Office Action dated June 15, 2006, no amendments have been made to the claims.

V. SUMMARY OF CLAIMED SUBJECT MATTER

As illustrated in the figures of the application¹, claim 10 calls for a refrigerator **1** comprising a refrigerator compartment **2** having a rear wall **5**, a control unit **4**, and at least one removable food support element **10** positioned within the refrigerator compartment **2**, *Application*, ¶ [0012], ln. 1-3; ¶ [0013], ln. 4. The removable food support element **10** has a user interface **12** for setting the working conditions of at least a portion of the refrigerator compartment **2** and for transferring the working conditions to the control unit **4**, *Id.*, ¶ [0013], ln. 1-5; ¶ [0015], ln. 1-3.. The refrigerator **1** further comprises an antenna package **16** configured to be removably inserted in the refrigerator compartment **2**, the antenna package **16** comprising at least one antenna **14** for receiving and transmitting data from the control unit **4** to the user interface **12**, *Id.*, ¶ [0023], 1-2; ¶ [0025], ln. 1-2; ¶ [0026], ln. 7-9.

¹ 37 CFR §41.37(c)(1)(v) requires reference to the specification by page and line number. The Application was filed without line numbers, but included paragraph numbers. Thus, references are given by page number, paragraph number, and the line number of the referenced paragraph.



VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. In the Office Action of June 15, 2006, the Examiner rejected claims 2-3 and 10-15 under 35 U.S.C. § 103(a) as allegedly being unpatentable over the alleged admitted prior art (“AAPA”) (paragraphs [0002-0003] of the Application) in view of U.S. Patent No. 4,509,335 to Griffin et al. (“Griffin”). Appellants disagree with the Examiner’s assertion that the AAPA and Griffin render claims 2-3 and 10-15 obvious to one skilled in the art.

B. In the Office Action of June 15, 2006, the Examiner rejected claims 4 and 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Griffin, and further in view of U.S. Patent No. 6,601,394 to Tatter (“Tatter”). Appellants disagree with the Examiner’s assertion that the AAPA, Griffin and Tatter render claims 4 and 6 obvious to one skilled in the art.

C. In the Office Action of June 15, 2006, the Examiner rejected claims 5 and 7 under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Griffin and further in view of U.S. Patent No. 5,033,272 to Yoshikawa et al. (“Yoshikawa”). Appellants

disagree with the Examiner's assertion that the AAPA, Griffin and Yoshikawa render claims 5 and 7 obvious to one skilled in the art.

D. In the Office Action of June 15, 2006, the Examiner rejected claims 8 and 9 under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Griffin, and further in view of U.S. Patent No. 4,876,860 to Negishi ("Negishi"). Appellants disagree with the Examiner's assertion that the AAPA, Griffen and Negishi render claims 8 and 9 obvious to one skilled in the art.

VII. ARGUMENTS

A.) Rejection of claims 2-3 and 10-15 under 35 U.S.C. § 103(a) over the AAPA in view of Griffin

Group A: Claims 2-3 and 10-15

Independent claim 10 calls for a refrigerator comprising at least one removable food support element positioned a compartment of the refrigerator and having a user interface for setting the working conditions of at least a portion of the refrigerator compartment and for transferring the working conditions to a control unit of the refrigerator and an antenna package configured to be removably inserted in the refrigerator compartment, the antenna package comprising at least one antenna for receiving and transmitting data from the control unit to the user interface.

Claims 2-3 and 11-15 are directly or indirectly dependent on claim 10 and are grouped with claim 10.

Paragraphs [0002]-[0003] of the current application ("Current Application") form what the Examiner refers to as the AAPA (alleged admitted prior art) and describes a refrigerator having a shelf that divides the refrigeration compartment of the refrigerator into two or more zones having different temperatures. The shelf is provided with an electronic control circuit for setting the temperature in the portion of the compartment above the shelf. An inductor or an antenna for the transmission of data to the electronic control circuit is embedded in the insulated

wall of the refrigerator.

The Current Application claims foreign priority on European Patent Application No. 03001239.7, which is published as EP1445560 (the "Priority Application"; a copy is attached as Exhibit A) with a filing date of January 21, 2003. The text of the Priority Application is virtually the same as the text of the Current Application with one pertinent exception: paragraph [0003] of Priority Application cites the source for the AAPA, whereas no source citation is given in the Current Application. The cited source is European application 2014881, which is published as EP1284400 (the Source Application, a copy is attached as Exhibit B) and was owned by Whirlpool Corporation at the time of filing of the Current Application. A comparison of paragraph [0003] of the Current Application and paragraph [0003] of the Priority Application is shown below, with the additional text present in the Priority Application and absent from the Current Application emphasized. This text unequivocally states that the source of the AAPA is the Source Application.

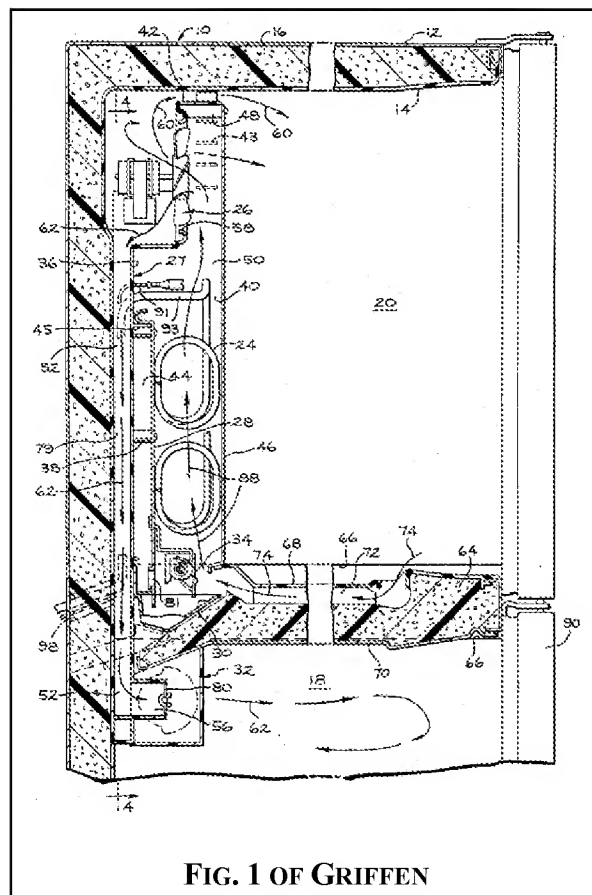
| Application, paragraph [0003] | EP1445560, paragraph [003] |
|---|--|
| To achieve different preservation temperatures, it is known to use a shelf in the refrigeration compartment for dividing the compartment into two or more zones having different temperatures. Such a shelf may be provided with an electronic control circuit for setting the temperature in the portion of the compartment above the shelf, without the need of using any cable or plug-socket connection since the transmission of data, as the power transmission to the electronic circuit of the shelf, could be carried out by inductors placed on the shelf and fixed in the wall of the refrigerator respectively. | <u>It is known from European application 2014881 of the Applicant, which forms a pre-characterising part of the main claim of the present document,</u> a shelf to be used in the refrigeration compartment for dividing such compartment in two or more zones having different temperatures. Such shelf is provided with an electronic circuit for setting the temperature in the portion of the compartment above the shelf, without the need of using any cable or plug-socket connection since the transmission of data, as the power transmission to the electronic circuit of the shelf, is carried out by inductors placed on the shelf and in the wall of the refrigerator respectively. |

Griffin et al. discloses a refrigerator having a modular refrigeration unit comprising a self-contained, pre-assembled module (22). The module (22) includes an evaporator (24) for cooling, a fan (26) for circulating air between the compartments (18, 20) of the refrigerator, a main support housing (27) on which the fan (26) is arranged, a drain pan member (30), a control assembly (32), and a defrost heater (34). The module (22) further includes a cover (46).

1. The AAPA is not an admission of prior art as asserted by the Examiner.

The statement forming the AAPA of the Current Application is not an admission of prior art under the applicable rule. The current rule regarding the admission of prior art is found in *Riverwood Int'l Corp. v. R.A. Jones & Co.*, 324 F.3d 1346, 1354, "This court and its predecessor have held that a statement by an applicant during prosecution identifying certain matter not the work of the inventor as "prior art" is an admission that the matter is prior art.", citing, *In re Nomiya*, 509 F.2d 566, 571 n.5, 184 USPQ 607, 611 n.5 (CCPA 1975).

The AAPA statement is not an admission under the rule of *Riverwood*. While *Riverwood* does not give express guidelines on when a statement becomes an admission, it does give examples. For example, *In re Nomiya* a statement that rose to the level of an admission centered on two drawings being labeled as "Prior Art" and described as such in the application. In contrast, in *In re Ehrreich*, 590 F.2d 902 (CCPA 1979) a statement in the form of a preamble to a



Jepson claim was not an admission of prior art. While *Reading Bates Construction Co. v. Baker Energy Resources Corp.*, 748 F.2d 645 (Fed. Cir. 1984) was decided on different grounds (the work of the same inventive entity may not be considered prior art against the claims unless it falls under one of the statutory categories), *Reading* sheds light on the underlying reasoning for an admission by stating, "...obviousness should not be based on an implied admission erroneously creating imaginary prior art." *Reading* at 649-650.

The teaching of these cases is that for a statement to be an admission of prior art, the statement must unequivocally identify the subject matter as prior art, like in *Nomiya*, and an implication is not sufficient. Under this standard, the statement for the AAPA of the Current Application is not an admission of prior art. The statement contains no express language that it is prior art. The statement is in a section of the Background labeled "Description of the Related Art", which is indicative of the relativity of the subject matter in the statement, not the prior art status of the text. Moreover, the statement is nothing more than a summary of another non-prior art patent application by one of the inventors of the Current Application. Therefore, the AAPA statement of the Current Application is not an admission of prior art and the AAPA is not prior art as asserted by the Examiner. As such, the combination of the AAPA with Griffin must fail as the AAPA is not admitted prior art. As the combination is improper, it follows that the rejection of claims 2-3 and 10-15 must also fail and claims 2-3 and 10-15 are patentable.

2. The Source Application is not prior art under 35 U.S.C. 102

While the AAPA statement is not prior art, it raises the issue of whether the Source Application, from which the AAPA statement finds its genesis, is prior art. For the Source Application to be prior art it must satisfy the requirements of 35 U.S.C. §102 (a)-(g) of which only 102 (a), (b) and (e) are possibly at issue. An application of 102 (a), (b), and (e) makes clear that the Source Application is not prior art.

According to § 706.02(a)(II)(C) of the MPEP, for 102 (a) to apply, the reference must have a publication date earlier in time than the effective filing date of the application, and must not be applicant's own work. The applicable procedure for determining the effective filing date

of an application is detailed in § 706.02(V)(C) of the MPEP, which states that if the application claims foreign priority under 35 U.S.C. 119(a)-(d), which the Current Application does, the effective filing date is the filing date of the U.S. application, *although the filing date of the foreign priority document may be used to overcome certain references* (emphasis added). MPEP § 706.02(b) states that a rejection based on 102(a) can be overcome by perfecting a claim to priority under 35 U.S.C. 119 (a)-(d). Therefore, the January 21, 2003 filing date of the Priority Application can be used for the purposes of disqualifying the Source Application as a 102(a) reference. Since, the Source Application has a publication date of February 19, 2003, which is later than the filing date of the Priority Application, the Source Application does not qualify as a 102(a) reference.

The Source Application also does not qualify as a 102(b) reference. For a reference to qualify as a 102(b) reference, it must be published more than one year prior to the effective filing date of the application. Regardless of any foreign priority claim, the filing date of the Current Application is January 15, 2004, setting a one-year bar date of January 15, 2003. Since, the Source Application has a publication date of February 19, 2003, which is after the one-year bar date of January 15, 2003, the Source Application does not qualify as a 102(b) reference.

The Source Application also does not qualify as a 102(e) reference as it is not a reference that was filed in the United States. As such, the Source Application does not qualify as prior art under 102(e).

Therefore, the Source Application does not qualify as prior art under 35 U.S.C. 102 (a), (b), or (e), and therefore cannot be used to reject the claims of the Current Application. As the AAPA is a summary of the Source Application, the AAPA likewise cannot be used to reject the claims.

For completeness, U.S. Patent No. 6,698,222 (“the ‘222 Patent”) is the US counterpart to the Source Application. The ‘222 Patent does qualify as prior art under 102(e), but not 102 (a) and (b). As the ‘222 Patent and the Current Application were commonly assigned to Whirlpool Corporation as of the filing date of the Current Application, the ‘222 Patent is disqualified as prior art under 35 U.S.C. §103 (c) for use as a prior art reference under 35 U.S.C. §103(a).

3. As the AAPA is not prior art, the combination of the AAPA and Griffin is improper and the rejection fails.

Therefore, the AAPA statement and its related patent applications and patents are not prior art against the Current Application. As such, the rejection of claim 2-3 and 10-15 over the combination of the AAPA and Griffin is improper because it is based on an improper combination. Claims 2-3 and 10-15 are patentable over the failed combination.

4. Assuming that the AAPA is prior art, the combination of the AAPA with Griffin is still improper

Assuming, *arguendo*, the AAPA is prior art against the Current Application, the combination of the AAPA and Griffin is still improper. The standards for a finding of obviousness must be strictly adhered to. Simply citing one or more prior art references that illustrate different facets of the invention and then concluding that it would be obvious to combine the references to create the applicant's invention is wholly inadequate. The following rules for combining prior art references for a finding of obviousness apply to the grounds of rejection.

A claimed invention is unpatentable if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art...The ultimate determination of whether an invention would have been obvious under 35 U.S.C. §103(a) is **a legal conclusion based on underlying findings of fact.**²

A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the

² The underlying factual inquiries include (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; and (3) the differences between the claimed invention and the prior art. *Graham v. John Deere Co.*, 383 U.S. 1, 17, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966).

field....Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher."

Most if not all inventions arise from a combination of old elements....Thus, every element of a claimed invention may often be found in the prior art....However, **identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention....**Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, **there must be some motivation, suggestion or teaching of the desirability of making the specific combination** that was made by the applicant....Even when obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference.

The motivation, suggestion or teaching may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved....In addition, the teaching, motivation or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references....The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art....Whether the Patent Office Examiner relies on an express or an implicit showing, **the Examiner must provide particular findings related thereto....Broad conclusory statements standing alone are not "evidence."**

In Re Werner Kotzab, 217 F.3d 1365; 55 U.S.P.Q.2d (BNA) 1313 (Fed. Cir. 2000)(citations omitted)(emphasis added).

a) The teachings of Griffin are mischaracterized

The combination of the AAPA and Griffin is based a mischaracterization of the teaching of Griffin and on flawed logic. Griffin teaches a pre-assembled cooling and air circulation

module. The mischaracterization of the teaching of Griffin arises when the modular refrigeration unit is described as a “movably mounted pre-assembled package (see Fig. 5) that is installed in the rear of a refrigerator in order to facilitate the assembly of the refrigerator.” To describe the modular refrigeration unit as a movably mounted pre-assembled package overstates the teaching of Griffin. The mischaracterization takes a specific teaching of a modular refrigeration unit and converts it into a generic movably mounted pre-assembled package.

The flawed logic arises when the Examiner states that “It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the admitted prior art system such that it included the use of a movably mounted package including the inductors and their corresponding electronic components in order to facilitate the assembly of the refrigerator view of the teachings of Griffin.” This obviousness statement erroneously modifies the already mischaracterized teachings of Griffin by adding the inductors to a generic movably mounted pre-assembled package. In these two steps of the obviousness argument asserted by the Examiner, the modular *refrigeration unit* as taught by Griffin has become a movably mounted pre-assembled package with inductors. Somewhere along the way in making the combination, the Examiner has dropped the specific teaching of the refrigeration unit of Griffin, and replaced the refrigeration unit of Griffin with inductors. There is no teaching or suggestion in either the AAPA or Griffin for such a dramatic change of replacing the refrigeration unit with inductors. Furthermore, there is no teaching or suggestion in Griffin of using any components other than the cooling and air circulation components in a re-assembled module.

b) No evidence of the level of ordinary skill in the art provided

The Office Action arrives at the erroneous combination by ignoring the basic elements required for a combination. The Office Action makes no attempt to analyze whether the knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to one of ordinary skill in the art as required for a showing of motivation as required in a *prima facie* obviousness rejection. This is clear in that the Office Action fails to provide any particular findings related to any motivation, suggestion, or teaching

of the desirability of adding the modular refrigeration unit of Griffen to the AAPA and then somehow replacing the cooling and air circulation components with inductors. Rather, the Examiner has simply relied upon "broad conclusory statements standing alone" that the combination would be obvious, which can only lead to the conclusion that the Examiner is simply relying on impermissible hindsight reconstruction of Applicants' invention.

c) The AAPA and Griffen combination is based on hindsight reconstruction

The Examiner takes the position that the teachings of Griffen would suggest to one of ordinary skill in the art the use of modular units to provide a convenient and quick way of assembling a refrigerator, regardless of what units are being assembled. However, examination of Griffen reveals that neither convenience nor speed of assembly is addressed by Griffen and is not touted as a benefit of the refrigerator module. There is furthermore no motivation, suggestion or teaching in the AAPA to place the inductors anywhere but in the wall of the refrigerator. Moreover, the Examiner does not provide any evidence supporting the position that convenient and quick assembly of refrigerator components is problem and that a modular unit would obviously be recognized as a solution by a person skilled in the art.

The AAPA and Griffen combination made by the Examiner can only be explained as being based on hindsight reconstruction. The Examiner has taken the specific teaching of a pre-assembled refrigerator module in Griffen and abstracted from it the generic teaching of a removable package in an effort to reach the claim language, and then moved the inductors of the AAPA from the wall, into the removable package. This is clear hindsight reconstruction.

Therefore, for at least these reasons the combination of the AAPA and Griffen is improper and the rejection of claim 10 fails accordingly. Claims 2-3 and 11-15 are grouped with claim 10 and thus the rejection of these claims also fails.

5. Assuming that the AAPA and Griffen are combinable, the combination does not render the claims obvious

Assuming, *arguendo*, that the combination of the AAPA and Griffen is tenable, the

combination still does not reach the claimed invention. The alleged combination would essentially result in the AAPA refrigerator having a removable refrigeration unit and the inductors still embedded in the wall of the refrigerator.

The alleged combination does not disclose an food support element having a user interface for setting the working conditions of at least a portion of the refrigerator compartment and for transferring the working conditions to a control unit. Neither the AAPA nor Griffin discloses a user interface on a food support element. Thus, the combination is completely missing one of the claimed elements of claim 10: a user interface on the food support element.

Furthermore, the alleged combination does not disclose an antenna package removably inserted in the refrigerator compartment with at least one antenna for receiving and transmitting data from the control unit to the user interface. Thus, the combination is completely missing another of the claimed elements of claim 10: an antenna package removably inserted in the compartment.

There is no teaching or suggestion in either the AAPA or Griffin to provide a user interface on the removable food support element or to move the inductors from their embedded state in the refrigerator wall and put them in a removable antenna package or add them to the refrigeration module. One of ordinary skill in the art would not think that the refrigeration module and the antenna are interchangeable as they perform entirely different functions. The refrigeration module provides chilled air for cooling the refrigerator compartment and the antenna is part of the data communications for the control unit. The knowledge required for each of the systems is different because refrigeration technology is quite different than data communications technology.

Therefore, the missing element of the user interface and the antenna package are not obvious in view of the AAPA and Griffin combination and claim 10 is patentable over the AAPA and Griffin combination. Dependent claims 2-9 and 11-15 are also patentable for the same reasons that claim 10 is patentable.

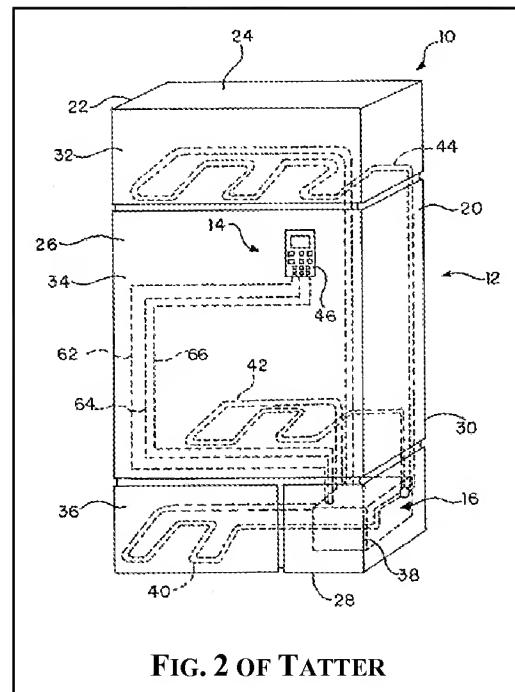
B.) Rejection of claims 4 and 6 under 35 U.S.C. § 103(a) over the AAPA in view of

Griffin, and further in view of Tatter

Tatter discloses a refrigerator having a housing and an external controller (14) with a display for displaying storage conditions in various separate compartments (32, 34, 36) of the refrigerator. The controller (14) is also used to set the storage conditions in each compartment (32, 34, 36).

Group B: Claims 10, 4 and 6

While the rejection is specifically related to claims 4 and 6, claim 10 will also be addressed as claims 4 and 6 are directly dependent on claim 10, and the grounds of rejection pertaining to claims 4 and 6 will be addressed with respect to claim 10.



1. The combination of the AAPA, Griffin, and Tatter is improper because the AAPA is not prior art.

The AAPA is not prior art for the reasons provided in sections (A.1) and (A.2) of this paper. As such, the combination of the AAPA, Griffin and Tatter is improper and the combination must fail, making claims 4 and 6 patentable over the failed combination. Therefore, applicants request that the rejection of claims 4 and 6 be withdrawn.

2. Assuming the AAPA is prior art, the combination of the AAPA, Griffin, and Tatter is improper.

Assuming, *arguendo*, the AAPA is prior art against the Current Application, the combination of the AAPA, Griffin and Tatter is improper. The addition of Tatter to the

underlying combination of the AAPA and Griffin does not remedy the previously described deficiencies in the underlying combination. As discussed above, the Examiner has failed to comply with the requirements for a finding of obviousness under 35 U.S.C. § 103(a) for the underlying combination. Therefore, claims 4 and 6 are patentable over the combination.

3. Assuming that the combination of the AAPA, Griffin, and Tatter can be made, the combination does not render the claims obvious

Assuming, *arguendo*, that the combination of the AAPA, Griffin and Tatter is tenable, the combination still does not reach the claimed invention. The alleged combination would essentially result in the AAPA refrigerator having a removable refrigeration unit and a single controller on the outside of the refrigerator, with the inductors still embedded in the wall of the refrigerator.

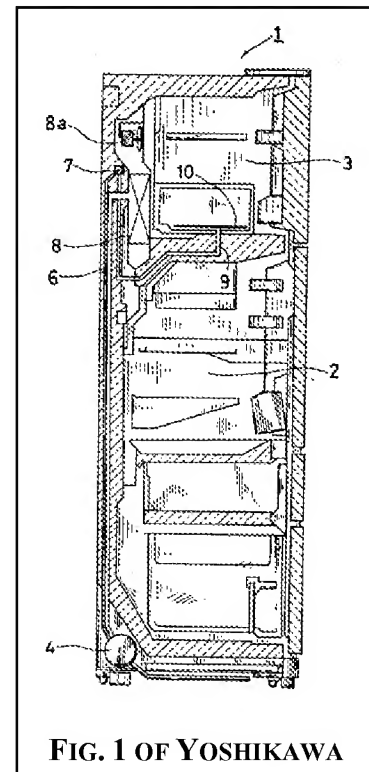
The AAPA, Griffin, and Tatter combination does not reach claim 10, because it does remedy the shortcomings in the underlying combination the AAPA and Griffin with respect to the user interface on the food support element and the antenna package. Specifically with respect to the user interface, the combination teaches an external controller, while claim 10 requires the user interface to be located on the food support element within the refrigerator compartment.

Furthermore, it would not have been obvious to move the controller from the external housing of the refrigerator to a food support element located inside the refrigeration compartment. There is no teaching or suggestion in Tatter of an internal controller, and in fact, Tatter teaches away from a internal controller, saying that "It would be most convenient if the aforementioned displays and settings were available for view and setting on the exterior of the refrigerator for convenience, observation and setting of the storage compartment conditions without need to open the door of the refrigeration unit" *Tatter, Col. 2, Ln. 23-27*.

Therefore, the AAPA, Griffin and Tatter combination does not reach claim 10, and claim 10 is patentable. Claims 4 and 6 are also patentable for at least these reasons based on their direct dependency on claim 10.

C.) Rejection of claims 5 and 7 under 35 U.S.C. § 103(a) over the AAPA in view of Griffin, and further in view of Yoshikawa

Yoshikawa discloses a refrigerator (1) having a storage compartment (2) and a freezer compartment (3). A cooler (10) in the form of a plate supporting an evaporator coil is provided in the freezer compartment (3) and is equipped with a temperature sensor (24). The sensor (24) detects the temperature of the cooler (10) or the surface of food placed on the cooler (10). A second temperature sensor (30) is provided at a suitable location on the outer wall, door, bottom, or upper portion of the refrigerator for detecting the ambient temperature.



Group C: Claims 10, 5 and 7

While the rejection is specifically related to claims 5 and 7, claim 10 will also be addressed as claims 5 and 7 are directly or indirectly dependent on claim 10, and the grounds of rejection pertaining to claims 5 and 7 will be addressed with respect to claim 10.

1. The combination of the AAPA, Griffin, and Tatter is improper because the AAPA is not prior art.

The AAPA is not prior art for the reasons provided in sections (A.1) and (A.2) of this paper. Therefore, the combination of AAPA, Griffin, and Tatter is improper and the rejection of claims 5 and 7 over the failed combination cannot stand. Therefore, applicants request that the rejection of claims 5 and 7 be withdrawn.

2. Assuming the AAPA is prior art, the combination of the AAPA, Griffin, and Yoshikawa is still improper.

Assuming, *arguendo*, the AAPA is prior art against the Current Application, the combination of the AAPA, Griffin and Yoshikawa is still improper. The addition of Yoshikawa to the underlying combination of the AAPA and Griffin does not remedy the previously described deficiencies in the underlying combination of the AAPA and Griffin. As discussed above, the Examiner has failed to comply with the requirements for a finding of obviousness under 35 U.S.C. § 103(a) for the underlying combination.

3. The AAPA, Griffin and Yoshikawa combination does not render the claims obvious

Assuming, *arguendo*, that the combination of the AAPA, Griffin and Yoshikawa is tenable, the combination still does not reach the claimed invention. The alleged combination would essentially result in the AAPA refrigerator having a removable refrigeration unit and a temperature sensor for detecting the temperature of the food support element or food placed on the food support element, with the inductors still embedded in the wall of the refrigerator.

The AAPA, Griffin, and Yoshikawa combination does not reach claim 10, because it does teach or suggest the user interface on the food support element and the removable antenna package.

Therefore, the AAPA, Griffin and Yoshikawa combination does not reach claim 10, and claim 10 is patentable. Claims 5 and 7 are also patentable for at least these reasons based on their direct dependency on claim 10.

D.) Rejection of claims 8 and 9 under 35 U.S.C. § 103(a) over the AAPA in view of Griffin, and further in view of Negishi

Negishi discloses a refrigerator (1) having an inner separation member (12) defining an inner storage space (S).

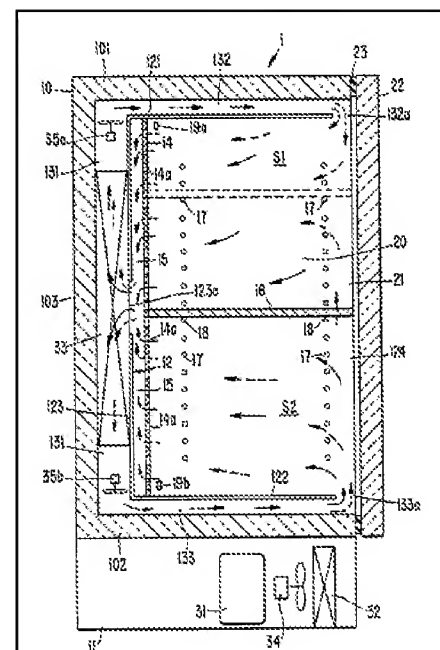


FIG. 1 OF NEGISHI

A rear space (131) is separated from the storage space (S), and is defined by an rear element (123) and a rear wall (103) of the refrigerator. A connecting hole (123c) is formed in the rear element (123) to allow air flow between the storage space (S) and rear space (131). An evaporator (33) is disposed in the rear space (131).

Group D: Claims 10, 8 and 9

While the rejection is specifically related to claims 8 and 9, claim 10 will also be addressed as claims 8 and 9 are indirectly dependent on claim 10, and the grounds of rejection pertaining to claims 8 and 9 will be addressed with respect to claim 10.

1. The combination of AAPA, Griffin, and Negishi is improper because the AAPA is not prior art.

The AAPA has been disqualified as prior art for the reasons provided in sections (A.1) and (A.2) of this paper. Therefore, the combination of AAPA, Griffin, and Tatter is improper and the rejection of claims 5 and 7 over the failed combination cannot stand. Therefore, applicants request that the rejection of claims 8 and 9 be withdrawn.

2. Assuming the AAPA is prior art, the combination of the AAPA, Griffin, and Negishi is still improper.

Assuming, *arguendo*, the AAPA is prior art against the Current Application, the combination of the AAPA, Griffin and Negishi is improper. The addition of Negishi to the underlying combination of the AAPA and Griffin does not remedy the previously described deficiencies in the underlying combination. As discussed above, the Examiner has failed to comply with the requirements for a finding of obviousness under 35 U.S.C. § 103(a) for the underlying combination.

3. The AAPA, Griffin, and Negishi combination does not render the claims obvious

Assuming, *arguendo*, that the combination of the AAPA, Griffin and Negishi is tenable,

the combination still does not reach the claimed invention. The alleged combination would essentially result in the AAPA refrigerator having a removable refrigeration unit and an airflow passage formed between separate spaces within the refrigerator, with the inductors still embedded in the wall of the refrigerator.

The AAPA, Griffin, and Negishi combination does not reach claim 10, because it does teach or suggest the user interface on the food support element and the removable antenna package.

Therefore, the AAPA, Griffin and Negishi combination does not reach claim 10, and claim 10 is patentable. Claims 8 and 9 are also patentable for at least these reasons based on their direct dependency on claim 10.

CONCLUSION

In view of the foregoing, it is submitted that the rejection of claims 2-15 is improper and should not be sustained. Therefore, a reversal of the rejections of claims 2-15 is respectfully requested.

Respectfully submitted,

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G0261566

VIII. CLAIMS APPENDIX

1. Cancelled.
2. (Previously Presented) The refrigerator according to claim 10, wherein the package is removable and faces the rear wall of the refrigeration compartment.
3. (Original) The refrigerator according to claim 2, wherein the package comprises at least some of the electronic components associated to the plurality of inductors.
4. (Previously Presented) The refrigerator according to claim 10, wherein each removable food support element comprises a display for providing the user with a feedback on the conditions set in the refrigerator compartment.
5. (Previously Presented) The refrigerator according to claim 10, wherein each removable food support element comprises one or more sensors for providing the user and the control unit of the refrigerator with a feedback on the actual conditions in the refrigerator compartment.
6. (Previously Presented) The refrigerator according to claim 10, wherein each user interface is adapted to set temperature and humidity.
7. (Previously Presented) The refrigerator according to claim 5, wherein the one or more sensors associated with each support element are adapted to provide a signal indicative of characteristics of food placed in the refrigerator compartment or portion thereof.
8. (Previously Presented) The refrigerator according to claim 15, wherein an evaporator is placed between the panel and the rear wall of the refrigerator.
9. (Previously Presented) The refrigerator according to claim 8, wherein a plurality of

apertures are provided in the panel for allowing airflow to the evaporator.

10. (Previously Presented) A refrigerator comprising:
 - a refrigerator compartment having a rear wall;
 - a control unit;
 - at least one removable food support element positioned within the refrigerator compartment and having a user interface for setting the working conditions of at least a portion of the refrigerator compartment and for transferring the working conditions to the control unit; and
 - an antenna package configured to be removably inserted in the refrigerator compartment, the antenna package comprising at least one antenna for receiving and transmitting data from the control unit to the user interface.
11. (Previously Presented) The refrigerator according to claim 10, wherein the at least one antenna comprises at least one inductor.
12. (Previously Presented) The refrigerator according to claim 10, wherein the antenna package comprises multiple antennas.
13. (Previously Presented) The refrigerator according to claim 12, wherein each of the multiple antennas comprises an inductor.
14. (Previously Presented) The refrigerator according to claim 10, and further comprising multiple removable food support elements.
15. (Previously Presented) The refrigerator according to claim 10, and further comprises a panel inserted in the refrigerator compartment in front of the rear wall to define a volume therebetween in which the antenna package is received.

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Filed: January 15, 2004
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Examiner: Gene L. Bankhead
Group Art Unit: 3744

IX. EVIDENCE APPENDIX

Attached as Exhibit 1 is European Patent Application No. 1,445,560

Attached as Exhibit 2 is European Patent Application No. 1,284,400

Application No: 10/757,890
Filed: January 15, 2004
Page 23 of 23

Examiner: Gene L. Bankhead
Group Art Unit: 3744

X. RELATED PROCEEDINGS APPENDIX

There being no decision rendered by a court or the Board in any related proceeding, none is listed here.

EXHIBIT 1



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.08.2004 Bulletin 2004/33

(51) Int Cl.7: **F25D 29/00, F25D 23/06**

(21) Application number: **03001239.7**

(22) Date of filing: **21.01.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT SE SI SK TR
 Designated Extension States:
AL LT LV MK RO

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(54) **Refrigerator with internal compartment divisible into independent temperature zones**

(57) A refrigerator (R) has a removable shelf (10) with setting means (12a) enabling the working conditions of the refrigerator compartment (2) or portion thereof to be set by the user, the information on the set conditions being transferred to control means of the re-

frigerator. The refrigerator (R) comprises a vertical wall (22) to be inserted in the refrigeration compartment (2), such wall (22) supporting inductor means (14, 14a) for receiving and/or transmitting data to said setting means (12a).

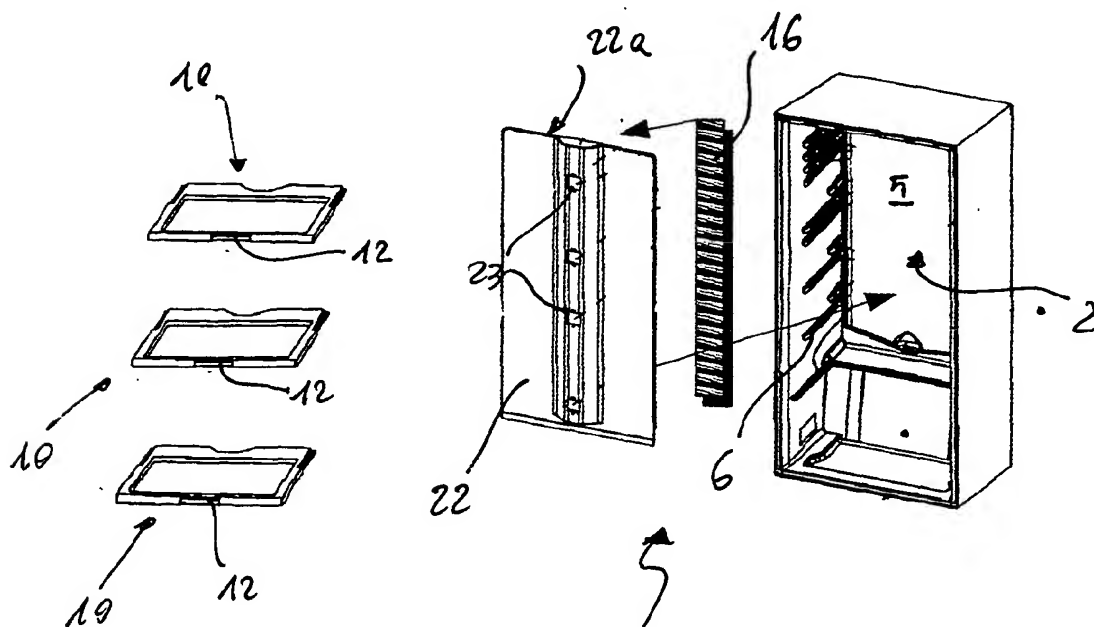


Fig. 1

Description

[0001] The present invention relates to a refrigerator in accordance with the introduction to the main claim. Herein, the term "refrigerator" means either an upright refrigerator in which the temperature is normally greater than -2°C, or a freezer in which the temperature is maintained constantly below 0°C.

[0002] As is well known, in a refrigerator (static or no-frost) it is very important to achieve a correct temperature in each of its preservation or freezing compartments in order to obtain optimum preservation of foods stored in it. In particular, it is well known that different foods storable in the compartment for preservation require different preservation temperatures, as for example the case of meat and fish compared with vegetables or dairy products.

[0003] It is known from European application 2014881 of the Applicant, which forms a pre-characterising part of the main claim of the present document, a shelf to be used in the refrigeration compartment for dividing such compartment in two or more zones having different temperatures. Such shelf is provided with an electronic circuit for setting the temperature in the portion of the compartment above the shelf, without the need of using any cable or plug-socket connection since the transmission of data, as the power transmission to the electronic circuit of the shelf, is carried out by inductors placed on the shelf and in the wall of the refrigerator respectively.

[0004] To have an inductor or an antenna embedded in the insulated wall of a refrigerator has some drawbacks since the production cycle of the refrigerator has to be modified. Moreover in case of failure of one or more embedded inductors or related electronic circuits, it is impossible to replace the defective component.

[0005] An object of the present invention is to provide a refrigerator in which zones at mutually independent temperatures can be obtained and in which the inductors or antennas associated with the refrigerator compartments and cooperating with corresponding inductors of the electronic circuit of the shelves can be easily installed and replaced in case of failure thereof.

[0006] Another object is to provide a refrigerator of the above type in which the shelves can provide a feedback to the user as far as the set and actual conditions in the refrigeration compartment or portion thereof are concerned.

[0007] These and further objects which will be apparent to the expert of the art are attained by a refrigerator in accordance with the accompanying claims.

[0008] The present invention will be more apparent from the accompanying drawings, which are provided by way of non-limiting example and in which:

Figure 1 is an exploded and schematic perspective view of a refrigerator according to the invention;

Figure 2 is a schematic front perspective view of a

shelf used in the refrigerator according to the invention;

Figure 3 is a block diagram showing how the electronic circuit of the shelf works; and

Figure 4 is an exploded perspective view of a component of the refrigerator according to the invention.

[0009] With reference to figure 1, an upright refrigerator R comprises an internal compartment 2 having a rear wall 5. Usual supports 6 are present on the lateral walls, to support shelves 10 formed in accordance with a patent application already filed in the name of the same Applicant.

[0010] Each shelf 10 comprises means to enable the internal temperature of the compartment 2 (or a temperature range corresponding to a determined food category) to be set and to be measured. These means cooperate with control means of the refrigerator for controlling the operation of this latter on the basis of the temperature or humidity setting selected by the user.

[0011] The setting means comprise a user interface 12 positioned on a front edge of the shelf 10. These means for setting the internal temperature or other working parameters of the compartment 2 are an electrical and/or electronic circuit suitably inserted into the shelf 10, for example an electrical circuit of passive type defined by an RLC resonant circuit and comprising an inductor positioned in correspondence with a rear edge of the shelf a plurality of capacitors of various capacitances. Each capacitor is connected on one side to an electrical line connected to one end of the inductor, and on the other side to a changeover switch arranged to connect each capacitor to a second electrical line, connected to an electrical branch connected to the other end of the inductor.

[0012] With reference to figure 2, the removable food support element or shelf 10 includes the user interface 12 on a front edge thereof. The user interface 12 presents buttons 12a for setting physical characteristics, like temperature or humidity, in the refrigerator compartment, and preferably in the portion of such compartment above the shelf. The user interface 12 has also a display 12b for showing the temperature (or humidity) set by the user or the temperature actually present in the compartment.

[0013] The display 12b can also give indications about food contained in the sub-volume (smell, weight, gas emission), and such indication can be provided by the shelf to the control circuit of the refrigerator as well.

The input device of the user interface 12, instead of buttons 12a, can include switches, electromagnetic sensors, reed switches activated by magnets on the shelf.

[0014] As an example a slider with a small magnet can be moved on the front side of the shelves 10, closing or opening some reed switches. The information obtained from reed switches is then used to set the temperature of the sub-volume above the removable shelf. In another example some capacitive touch sensors placed on the

shelf user interface 12 are used in order to detect customer touch. Status of the sensor is continuously checked, and detection of a touch is then used to set the temperature of the sub-volume above the removable shelf.

[0015] The display 12b of the shelf can give a feedback to the user about data relative to actual physical characteristics of the sub-volume (temperature, humidity, temperature gap with a set temperature) or to characteristics of the food placed in the sub-volume. In order to provide the above feedback each shelf 10 can be provided with one or more specific sensor. Feedback is provided in a optical way (using a light, display, LED) or in an acoustical way. Information content is associated to a color or color variation, to a numerical or alphanumerical indication, to an icon indication, to a particular sound or sound combination.

[0016] In the following we will refer to each electrical or magnetic device used for coupling the inductor of the shelf 10 to the refrigerator circuit as "antenna".

[0017] The information is delivered to the refrigerator by means of an electromagnetical signal, generated from an analog circuit or from a digital device being part of the circuit of the shelf 10.

[0018] The signal contain data in numerical form, or data are associated to a signal peculiarity, like frequency, phase or amplitude. After generation, the signal is then modulated with a modulation scheme, amplified and transferred to the antenna section, where an electromagnetic wave is generated (Figure 3).

[0019] An information coming from the refrigerator control circuit can be received by the same antenna section, and then demoduated and transferred to an analog or digital circuit. The retrieved data are elaborated and the feedback elements are then controlled in the most appropriate form.

[0020] The power for electronic parts on the shelves 10 is obtained from a low frequency signal generated in the refrigerator. This signal is filtered, charging some energy storing elements like a capacitor, and a continuous like voltage is obtained to supply circuitry. As an alternative solution batteries or accumulators can be used to provide power at the shelf electronic circuits.

[0021] With reference to figures 1 and 4, on the refrigerator side several antennas 14 are placed in order to receive data from a shelf 10 and transmit data to it. Each antenna 14 is part of a resonant circuit and it is realized with one or more inductors 14a, placed in series or in parallel.

[0022] Each of these inductor couples with the antenna of the respective shelf only when the shelf 10 is placed in the position closer to the inductor 14a (the shelf have some fixed positions).

[0023] The data transmitted from the shelf 10 are then digitalized and sent to a control circuit of the refrigerator. Each of said antenna 14 is also used to transmit the carrier signal to the shelves circuits and to send data via a carrier superimposed signal. For an easy mounting and

assembling, a package 16 for antennas 14 is realized as described in figure 4.

[0024] A plastic flat support 3 is realized with some protrusions P, on which coils 14a are inserted. Coils 14a are then connected to a local electronic circuit 18 which generates the carrier signal and demodulates the signal received from the shelf 10, giving a digital signal as output. The signals from all the electronic circuits 18 are then collected through a connector 20 connected to the control system of the refrigerator. A second plastic part 16b covers the coils 14a, therefore allowing a complete package 8 of the antenna system. The complete package 16 is then assembled to a rear surface 22a of a removable wall or panel 22 to be mounted inside the cavity of the refrigerator R (figure 1). The wall or panel 22 can be of the same polymeric material of the refrigerator liner, so that the user sees it as the back wall of the cavity.

[0025] In an alternative implementation only coils 14a are packaged (no local electronic circuit 18 is provided), and the terminals are connected with a connector to the control system of the refrigerator.

[0026] The package 16 is mechanically fixed to the back surface 22a of the removable panel 22 of the refrigerator R as described in Figure 1, by means of plastic clips, using an adhesive layer or with screw. The panel 22 is then fixed in front of the refrigerator cavity back wall 5. In an alternative solution (not shown in the drawings), the box-like package 16 can be replaced by an adhesive strip having the coils 14a fixed therein.

[0027] The technical solution according to the invention is particularly useful in a refrigerator where a volume is defined between the back wall 5 of the cavity and the removable wall 22, such volume being used for placing an evaporator of the refrigeration circuit. Such kind of refrigerator was described in a previous patent application of the same applicant. This means that it is not necessary to have another added component to be inserted in the cavity 2, since it can be exploited an already existing component used for thermodynamic purposes.

[0028] According to such solution, apertures 23 are provided in the removable wall or panel 22, some of these apertures 23 being provided with fans for assuring an exchange of air between the compartment 2 and the volume in which the evaporator is placed.

[0029] Of course the technical solution according to the invention can be used also for traditional refrigerators; in this case the removable wall 22 will be installed closer to the back wall of the cavity. Moreover, the position of the removable panel 22 can be different, for instance it can be placed on a sidewall of cavity 2.

Claims

1. Refrigerator (R) having a removable food support element (10), for example a shelf, drawer or the like, to be positioned in a refrigerator compartment (2), such element having setting means (12a) enabling

the working conditions of the refrigerator compartment or portion thereof to be set and the information on the set conditions to be transferred to control means of the refrigerator, **characterised in that** it comprises a substantially vertical wall (22) or the like to be inserted in the refrigeration compartment (2), such wall (22) supporting inductor means (14, 14a) for receiving and/or transmitting data to said setting means.

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2. Refrigerator according to claim 1, **characterised in that** said wall (22) is removable and faces the rear wall (5) of the refrigeration compartment (2).

3. Refrigerator according to claim 2, **characterised in that** said induction means comprise at least one coil (14a) supported on a rear surface (22a) of the wall (22) facing the rear wall (5) of the refrigerator compartment (2).

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4. Refrigerator according to claim 3, **characterised in that** said induction means comprise a plurality of coils (14a) contained in a package (16) to be fixed to the rear surface (22a) of the wall (22) so that each coil (14a) corresponds substantially to a related removable food support element (10).

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5. Refrigerator according to claim 4, **characterized in that** the package (16) comprises at least some of the electronic components (18) associated to the inductor means.

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6. Refrigerator according to any of the preceding claims, **characterised in that** the removable food support element (10) comprises display and/or acoustic means (12b) in order to provide the user with a feedback on the conditions set in the refrigerator compartment (2) or portion thereof.

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7. Refrigerator according to claim 6, **characterised in that** the removable food support element (10) comprises sensor means in order to provide the user and/or the control circuit of the refrigerator (R) with a feedback on the actual conditions in the refrigerator compartment (2) or portions thereof.

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8. Refrigerator according to any of the preceding claims, **characterised in that** the setting means are adapted to set temperature and humidity.

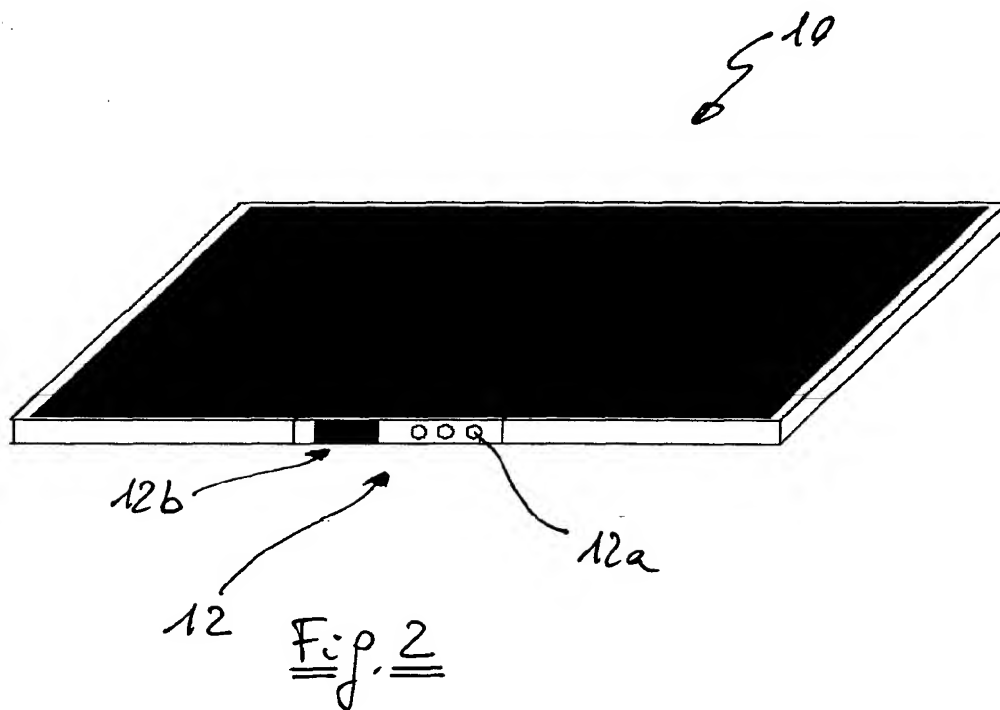
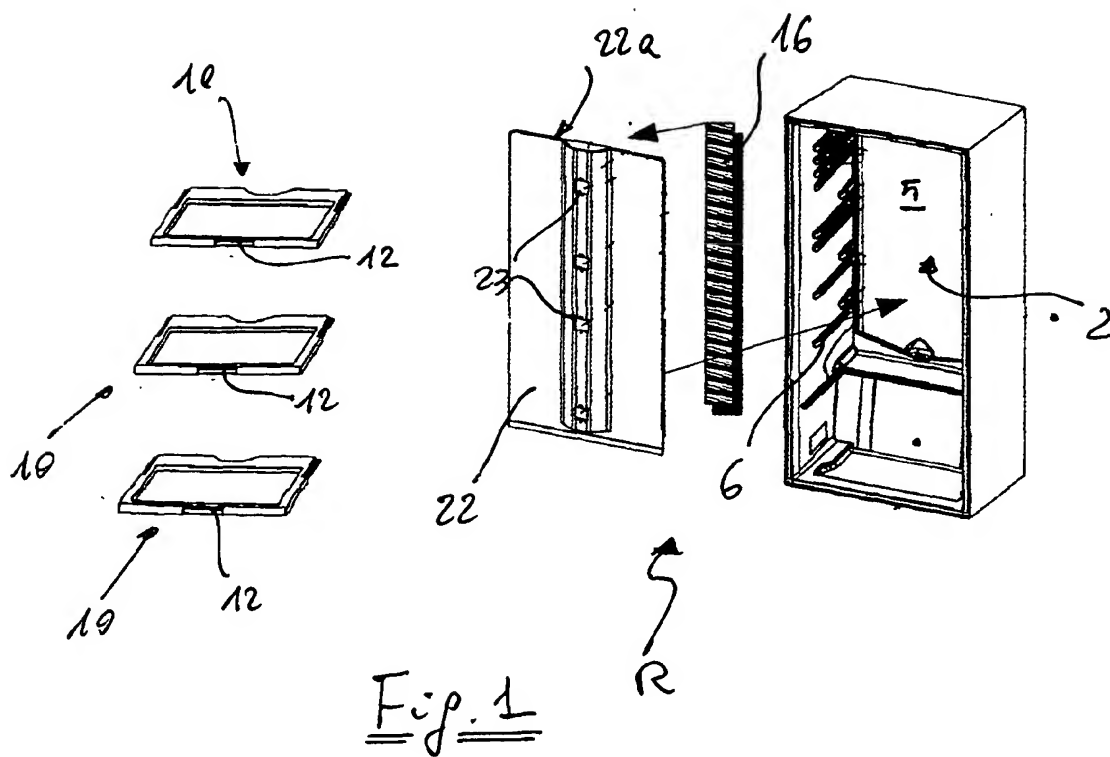
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9. Refrigerator according to claim 7, **characterised in that** the sensor means are adapted to provide a signal indicative of characteristics of food placed in the refrigerator compartment or portion thereof, including gas emission and weight.

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10. Refrigerator according to any of the preceding claims, **characterised in that** in the volume defined

between the panel (22) and the rear wall (5) of the refrigerator compartment (2) an evaporator is placed, apertures (23) being provided in the wall (22) for allowing air flow.



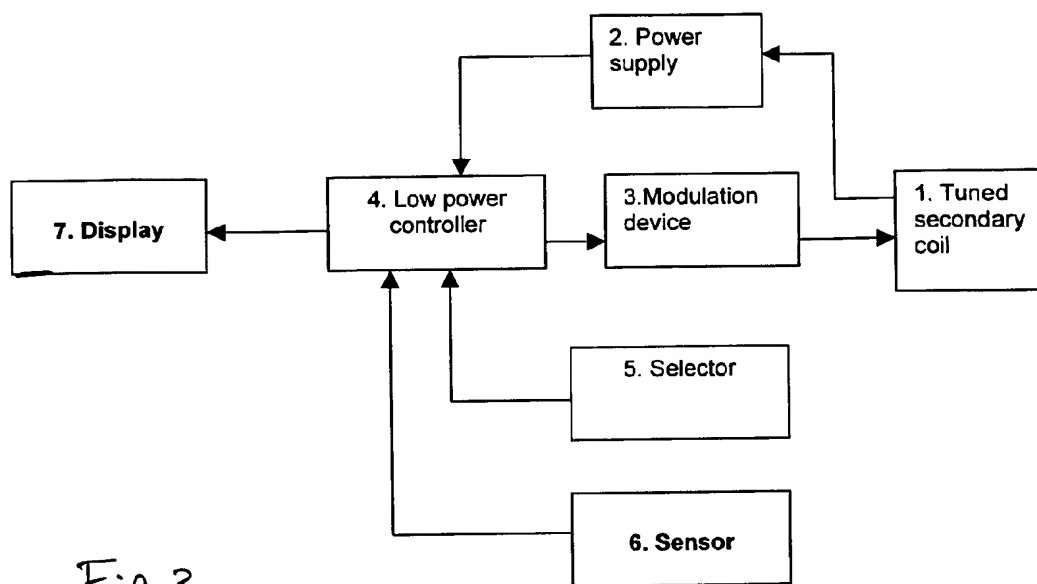


Fig. 3

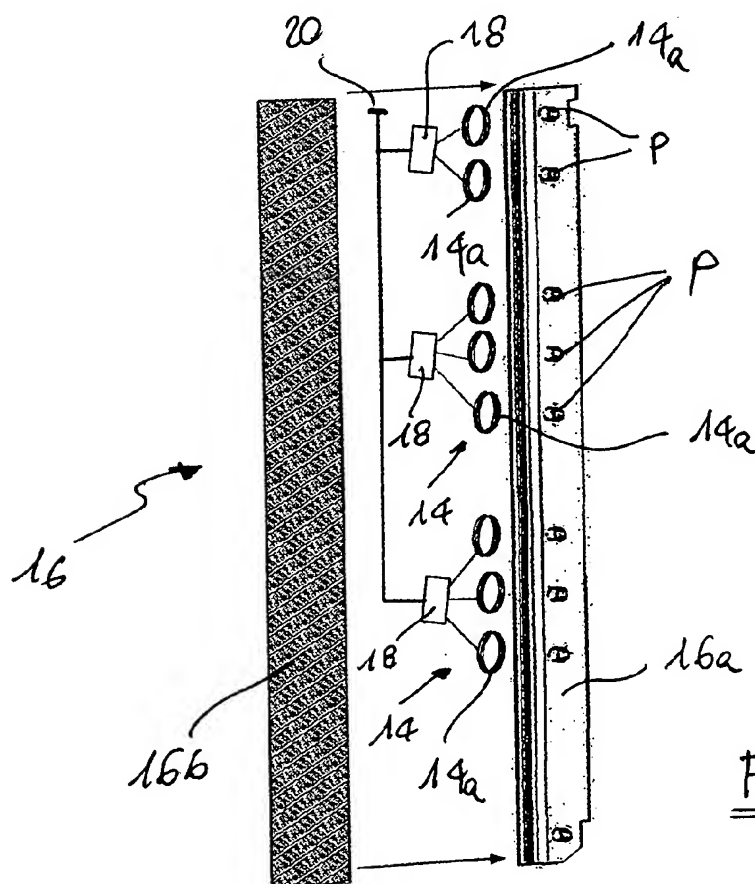


Fig. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 00 1239

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
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| | | | F25D |
| The present search report has been drawn up for all claims | | | |
| Place of search MUNICH | | Date of completion of the search 24 April 2003 | Examiner Zanotti, L |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p> | | | |

EPO FORM 1503 03 02 (P04001)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 00 1239

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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24-04-2003

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EXHIBIT 2

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 284 400 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.02.2003 Bulletin 2003/08

(51) Int Cl.7: **F25D 29/00, F25D 25/02**

(21) Application number: **02014881.3**

(22) Date of filing: **04.07.2002**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SK TR**
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **14.08.2001 IT MI20011798**

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(54) **Removable food support element with temperature setting means, and a refrigerator containing such a support element**

(57) A removable food support element in a refrigerator (1), for example a shelf (6), drawer or the like, comprising a body (15) to be positioned on supports present on opposing walls (3, 4) of a refrigerator compartment (2); there being provided, associated with the body (15) of the element (6), setting means (10) ena-

bling the internal temperature of the refrigerator compartment (2) to be set and the set temperature information to be transferred to control means (11) for the refrigerator refrigeration circuit (12).

The refrigerator (1) provided with such a compartment is also claimed.

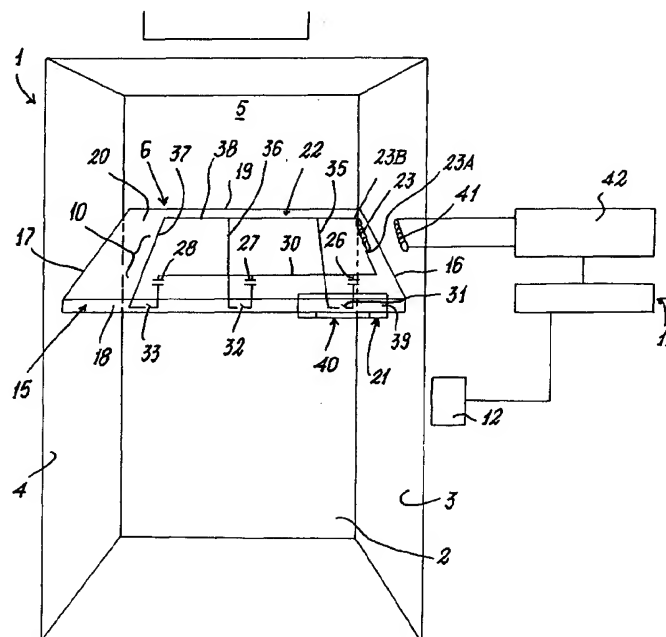


FIG. 1

Description

[0001] The present invention relates to a food support element in a refrigerator, in accordance with the introduction to the main claim. The term "refrigerator" used herein means both refrigerated cabinets in which the temperature is normally higher than 0°C, and freezers in which the temperature is maintained below 0°C.

[0002] In a refrigerator (static or forced-air) it is very important to correctly determine the temperature of each of its preservation or freezer compartments in order to obtain optimum preservation of the foods contained therein.

[0003] Various devices are known for enabling said determination, these devices generally measuring said temperature in correspondence with a wall of said compartment or in correspondence with a conduit through which air is fed into the compartment (in the case of a forced-air refrigerator), or indirectly by measuring the evaporator temperature. Although enabling functional monitoring of the temperature in the refrigerator compartment, these devices do not enable the actual temperature within the compartment to be measured or to be maintained at the desired optimum value within the compartment on the basis of the foods present therein. In this respect, this temperature is set by the user by operating an appropriate control associated with a structural part of the refrigerator (compartment wall or door, for example), this setting being maintained by measuring the obtained temperature using the aforesaid known devices, this measurement never however being taken directly at a point in the interior of said compartment, i.e. between its walls where the foods are present, with obvious drawbacks (for example measurement inaccuracies or the need for complex systems for processing the temperature information obtained for example in proximity to a wall in order to define the temperature present within the compartment).

[0004] An object of the present invention is therefore to provide a removable refrigerator element of the aforesaid type which enables a temperature to be set, or enables a class of foods to be set to which a determined temperature range corresponds, and which is to be obtained and possibly maintained within the refrigerator compartment or within a particular region thereof.

[0005] Another object is to provide an element which is reliable and easy to use. A further object is to provide an element which, in a refrigerator or in a forced-air freezer, enables a particular temperature to be maintained within that particular region of the refrigerator compartment in which the element is positioned, on the basis of the type of food positioned on the element.

[0006] These and further objects which will be apparent to the expert of the art are attained by an element in accordance with the accompanying claims. The present invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 shows schematically one embodiment of a shelf according to the invention inserted into a refrigerator compartment;

Figure 2 is a perspective front view of the shelf of Figure 1; and

Figure 3 is a schematic diagram of an electrical/electronic circuit enabling the temperature to be set within the interior of the compartment of Figure 1 in which several shelves according to the invention are present.

[0007] With reference to said figures, a refrigerator is shown schematically in Figure 1, where it is indicated by 1. The refrigerator can be of the known static or forced-air type.

[0008] In the example, the refrigerator is an upright refrigerator and comprises an internal compartment 2 having opposing lateral walls 3, 4 and an end wall or shoulder 5. Usual supports (not shown) are present on the lateral walls to support a shelf 6 formed in accordance with the invention.

[0009] The shelf 6 comprises means 10 to enable the internal temperature of the compartment 2 to be set (or a temperature range corresponding to a determined food category to be set) and possibly to be maintained. These means 10 cooperate with the control means 11 controlling the operation of the refrigerator 1, in order, to control and regulate, on the basis of the temperature setting obtained by the setting means, the operation of a usual refrigeration circuit schematically shown in Figure 1 and indicated by 12.

[0010] More specifically, the shelf 6 comprises a body 15 presenting lateral faces 16 and 17 to face the walls 3 and 4 of the compartment 2, a front face 18 and a rear face 19. The shelf 6 presents a flat surface 20 for supporting foods. According to the invention, the body 15 contains the setting means 10 associated with operating means 21 positioned preferably on the aforesaid front face 18. These means for setting the internal temperature of the compartment 2 are an electrical and/or electronic circuit 22 suitably inserted into the body 15, and can be of active type (i.e. self powered for example by batteries) or of passive type.

[0011] In the figures the circuit 22 is an electrical circuit of passive type defined by an RLC resonant circuit and comprising an inductor 23 positioned in correspondence with the lateral face 16 of the body 15 of the shelf 6 and a plurality of capacitors (for example three, as in the figures where they are indicated by 26, 27 and 28) of various capacitances. Each capacitor is connected on one side to an electrical line 30 connected to one end of the inductor 23, and on the other side to a change-over switch (31, 32 and 33 respectively) arranged to connect each capacitor to a second electrical line 35, 36 and 37 respectively, connected to an electrical branch 38 connected to the other end of the inductor 23.

[0012] Using the operating means 21, a different change-over switch can be activated to connect the cor-

responding capacitor to the inductor in such a manner as to modify the resonance frequency of the circuit 22.

[0013] The operating means 21 can be defined by a plurality of pushbuttons P1, P2, P3 and P4 (Figure 2) connected to the various capacitors and which, when pressed, result in the selection of a temperature suitable for preserving different foods. For this purpose, each pushbutton carries a symbol corresponding to a particular food. Alternatively, the operating means 21 can be defined by a slidable selector 39 movable along the face 18 of the body 15 of the shelf 6, or by a slidable reed relay, in which case the selector 39 carries a magnet 40 which on sliding in front of the change-over switch defined by a relay, closes it onto the corresponding electrical line. This results in the selection of a particular capacitance for the circuit 22 and hence the selection of a particular resonance frequency.

[0014] Hence a respective desired temperature within the compartment 2 can be made to correspond to each frequency variation of the circuit 22, this temperature being selected for example via the selector 39.

[0015] To enable the circuit 21 to operate, an inductor 41 is positioned in that wall 3 of the compartment 2 which faces the face 16 of the shelf body 15, and is connected to an oscillating circuit 42 connected to the refrigerator control means 11, for example a microprocessor circuit. On powering the oscillating circuit 42, of which the inductor 41 forms part, the circuit 21 is activated, so that each variation in the resonance frequency of said circuit 21 (obtained in the aforesaid manner) is noted as a variation in the resonance of the circuit 42; this is then determined by the control circuit or means 11 which, on the basis of the variation, act on the refrigeration circuit 12.

[0016] Specific reference will now be made to Figure 3 showing a plurality of shelves 6 cooperating with an electrical/electronic circuit which determines their resonance frequency variation and on the basis thereof acts on the refrigeration circuit 12. If the embodiment of Figure 3 is used in a forced-air refrigerator, a particular temperature on each shelf of the refrigerator compartment 2 can be obtained by adjusting in known manner the usual members for modifying the feed of refrigerated air into the various regions of the compartment 2. In this case the shelves 6 are constructed of thermally insulating material.

[0017] The use of the invention will now be described with reference to Figure 3. It will be assumed that the uppermost shelf 6 of Figure 3 is to be used. The other shelves will be assumed not to be in use or, if present in the compartment 2, not to be used for setting a local temperature within the refrigerator compartment 2.

[0018] As shown in Figure 3, the control circuit 11 (for example a microprocessor) is connected to the control voltage generator or sweep generator 50, connected to the oscillator 42 which operates with controlled voltage. This latter is connected to a switching element 53 which selects the appropriate inductor 41 for interrogating a

determined shelf.

[0019] On powering the circuit 42, of which the inductor 41 forms part, and varying the capacitance of the resonant circuit 21, the resonance frequency of the oscillator undergoes, as stated, a variation which is determined by a usual signal sensor 55 (for example a dip catcher), and is therefore determined by the circuit 11. On the basis of this determination, corresponding to the selection of a particular temperature within the compartment 2, the circuit 21 acts on the refrigeration circuit 12 to obtain the desired temperature within the compartment 2 (in correspondence with the shelf 6).

[0020] If several shelves 6 are present and "active" within the refrigerator, for example a forced-air refrigerator, any signal variations of the corresponding inductor 41 are discriminated by the control circuit 11 which, by directly operating the switching element, is always able to recognize which inductor has been the origin of the signal generated by the oscillator 42. On the basis of this determination, the circuit 11 can vary the temperature of that portion of the compartment 2 comprising the shelf 6 in question.

[0021] In a further embodiment of the invention, any deviation in the actual temperature from that set for each shelf 6 of the invention can be determined directly by the circuit 11, as this temperature variation results in a proportional variation in the capacitance of the capacitor selected by the circuit 21 and hence a variation in the resonance frequency of said circuit (determined by the control circuit 11). This circuit acts on the refrigeration circuit 12 on the basis of this determination.

[0022] Two embodiments of the invention have been described. Others can however be devised in the light of the present invention. For example, as stated, the circuit 22 can be of active type and comprise remote connection means (for example of radio-frequency, or other type) able to dialogue with the control means 11 in order to "inform" these latter of the temperature selected by the user for the shelf 6. Alternatively, the circuit 22 can be of the described type, but self-powered and cooperating with a device (passive, of inductor type) connected to the means 11 and not comprising the oscillator 42, the generator 50 or the sensor 55. Moreover, although the described examples refer to a shelf, the circuit 22 can also be provided on a food containing drawer (for example, as in the case of upright freezers).

Claims

1. A removable food support element in a refrigerator (1), for example a shelf (6), drawer or the like, comprising a body (15) to be positioned on supports present on opposing walls (3, 4) of a refrigerator compartment (2), **characterised by** comprising, associated with the body (15) of the element (6), setting means (10) enabling the internal temperature of the refrigerator compartment (2) to be set

and the set temperature information to be transferred to control means (11) for the refrigerator refrigeration circuit (12).

2. An element as claimed in claim 1, **characterised in that** the setting means comprise an electrical circuit (22) arranged to generate a signal which can be modified on the basis of the set temperature, or of a set temperature range, by modifying at least one electrical characteristic of that circuit. 5 10
3. An element as claimed in claim 2, **characterised in that** the electrical circuit is a resonant circuit (22) comprising a plurality of capacitors (26, 27, 28) of different capacitances selectively connectable to an inductor (23) cooperating with an induction element (41) associated with the control means (11) and fixed to the refrigerator (12). 15
4. An element as claimed in claim 3, **characterised in that** the resonant circuit is of passive type, the induction element (41) being connected to an oscillating circuit (42) connected to the control means (11), and receiving an electrical signal from said circuit (42). 20 25
5. An element as claimed in claim 3, **characterised in that** the resonance circuit (22) is self-powered.
6. An element as claimed in claim 3, **characterised by** comprising operating means (21) operationally cooperating with the resonant circuit (22) to select a capacitor (26, 27, 28) of capacitance chosen on the basis of the desired temperature or of the desired temperature range in correspondence with the element (6). 30 35
7. An element as claimed in claim 6, **characterised in that** the operating means are a selector (39) movable on a face, preferably the front face (18), of the element (6). 40
8. An element as claimed in claim 6, **characterised in that** the operating means are a plurality of pushbuttons (P1, P2, P3, P4) operationally connected to the various capacitors (26, 27, 28). 45
9. An element as claimed in claim 6, **characterised in that** the operating means (21) act on switches (31, 32, 33) arranged to connect different capacitors (26, 27, 28) to the inductor (23). 50
10. An element as claimed in claim 2, **characterised in that** the electrical circuit (22) comprises radio-frequency signal generating means cooperating with receiving counter-means connected to the control means (11). 55

11. An element as claimed in claim 1, **characterised by** comprising means for measuring the temperature present in the refrigerator compartment (2).

12. An element as claimed in claims 3 and 11, **characterised in that** the measurement means are the capacitors (26, 27, 28) of the resonant circuit.

13. A refrigerator or freezer comprising at least one internal compartment (2) in which at least one removable food support element (6), for example a shelf, a drawer or the like, is positioned, **characterised in that** the element (6) is of the type in accordance with any one of the preceding claims.

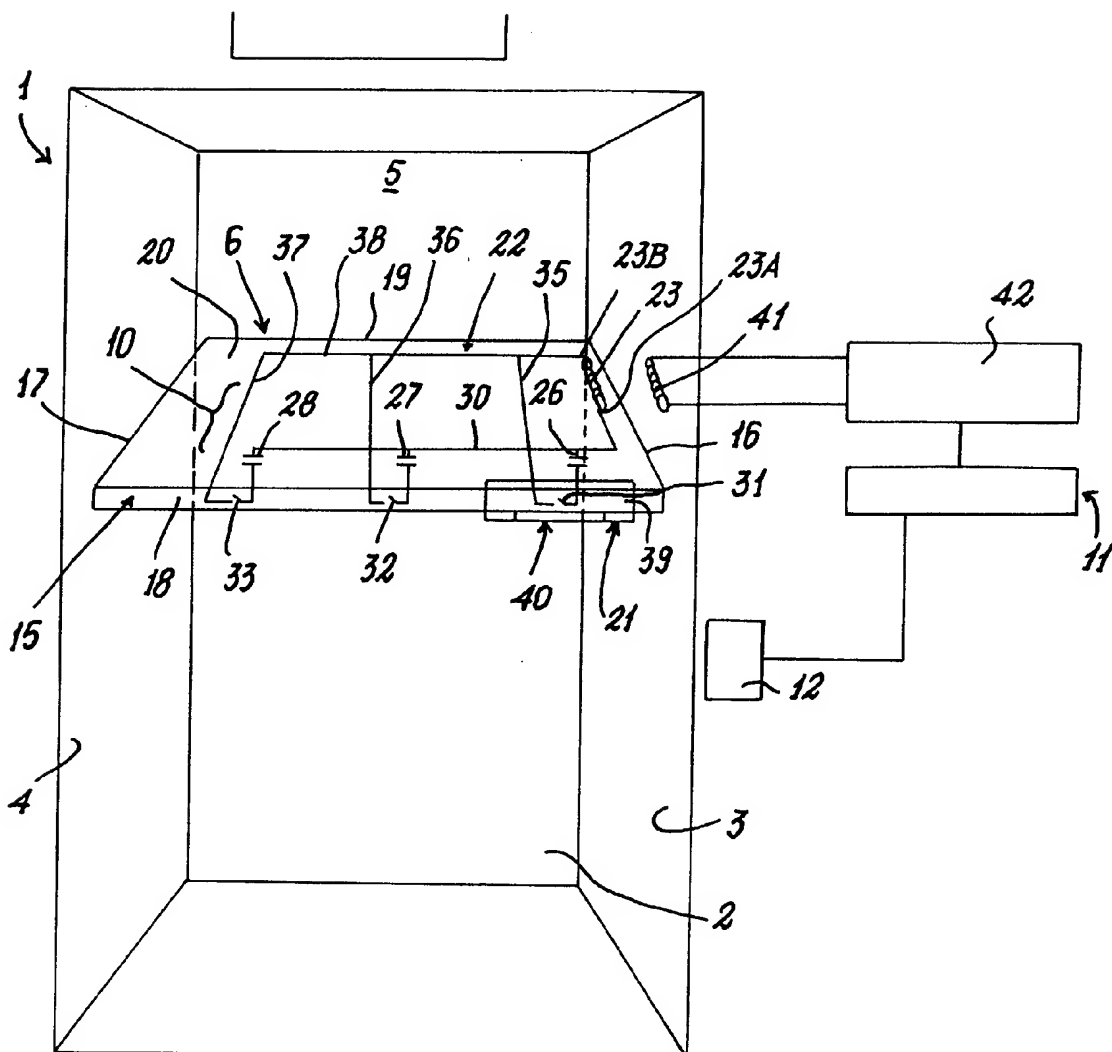


FIG. 1

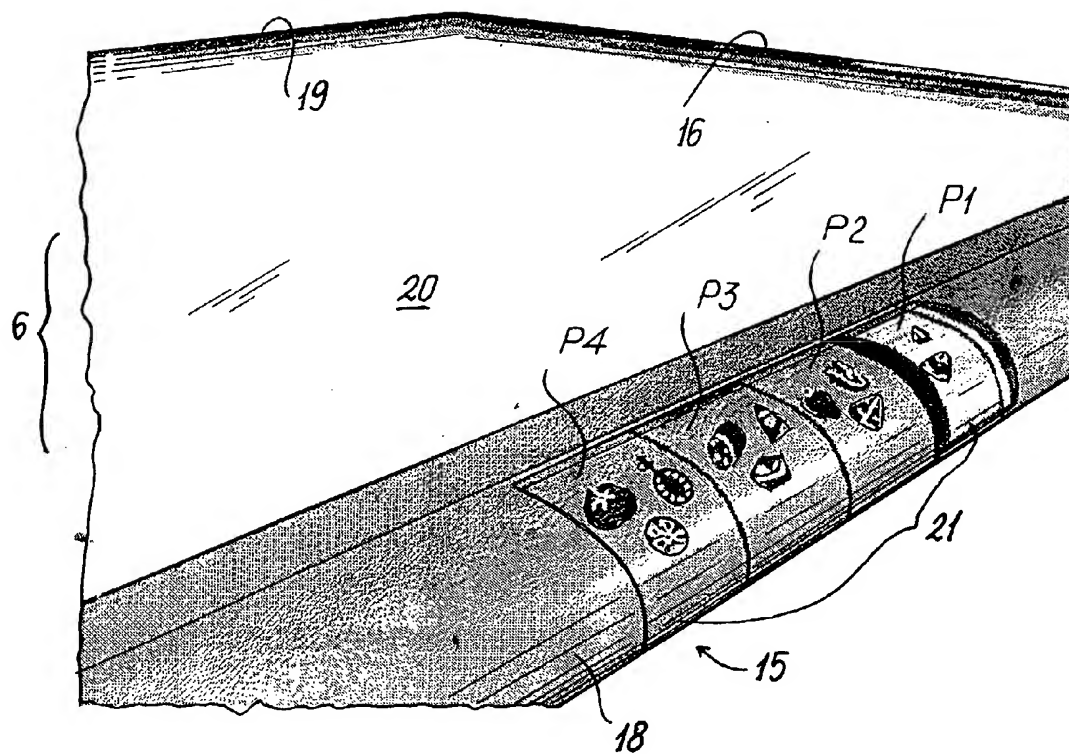


FIG. 2

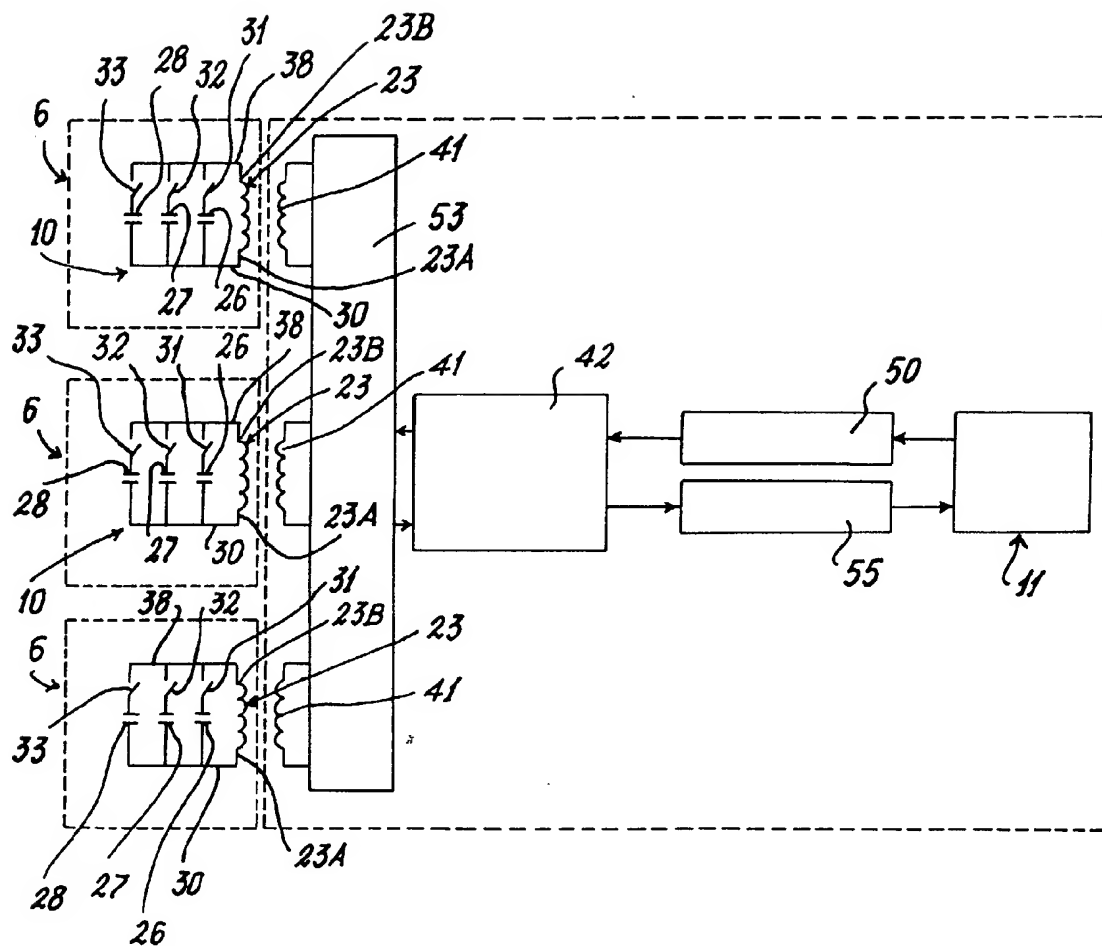


FIG. 3



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| THE HAGUE | | 22 November 2002 | SOGNO, M |
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